

TECHNO-LEGAL AND TECHNO-FINANCING REGIME FOR DISASTER RISK MITIGATION FOR LANDSLIDES

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VS

Impact of Landslide Disasters

- **The impact and socio-economic cost due to landslides are much higher and difficult to estimate and have long-term repercussions on societies**
- **There are:**
 - **Damages to houses and other building**
 - **Blockade of Roads and lifelines**
 - **Blockade to hydraulic paths**
 - **Damage to water supply, power supply and communication facilities**
 - **Bodies buried under debris**
 - **Disposal of human dead bodies, carcasses of cattle and animals**

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Imperatives for Promoting Safer Buildings/ Construction

- With a view to ensure that the massive financial resource investments for housing and other public asset buildings and infrastructure are safe, strong, durable and perform well during life cycle, it is essential that these are:
 - Flood protected
 - Land slide protected
 - Earthquake Resistant

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Awareness Creation

- Most communities unaware of vulnerability of neighbourhood to disasters, Flood basin, Seismic Zone, Landslide Zone
- Lack of risk assessment from
 - Mapping for the same
 - Vulnerability Atlas for Landslides / Floods
- Awareness to permeate at all levels

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Appreciation

- **Lack of appreciation**
 - On safe locations (prohibited sites and restricted sites with precautionary limitations)
 - On protection measures to site/ neighbourhood and accessways
 - Afforestation, Tree Plantation, Slope Protection

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Application

- Safer building construction with landslide / protected planning, design and construction would need to create enabling environment for Application of all norms for safety namely,
 - Structural Safety
 - Fire Safety
 - Health Safety
 - Construction Safety
- These can be ensured by adopting many action areas for Application

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Engineering

- Use of vulnerability/ hazard maps/ atlas for assessing the multiple vulnerability for effective and safe design to be introduced
- Demonstration units for live display of technologies to be put up – “seeing is believing” by using construction medium as a message
- For non-engineered buildings, it is essential to ensure adherence to disaster resistant construction through community awareness and preparedness
- Need for illustrated manuals, with Do's and Don'ts and Guidelines to be published in vernacular languages covering ABCDE of Landslide protection.
A- Anchorage, B- Bracing, C- Connections,
D- Detailing, E- Environment protection

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Land Slide-Remediation Technologies and Practices

- Slope Dressing and Treatment(Asphalt Mulch Technique/Coir Geo-textiles)
- Gabion Walls
- Anchored Drum Diaphragm walls
- Bio-Engineering
- Surface/Sub-surface Drainage
- Providing Restraining structures(Nailing, Bolting, Anchoring)
- Tie-back Solutions
- Reinforced Earth Applications

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Enforcement

- The existing building regulatory media operated by the city planners and city engineers/ building officials are normally **silent / deficient** with respect to provisions of landslide protection construction features
- The availability of land development rules for stability and slope protection with good enforcement, while approving land and building development proposal with safe distances would go a long way in helping the community for safer developments in landslide affected (vulnerable) zones (10m distance control for steep slope areas is recommended in NBC of India 2005).

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Land Slide Control National Standards

- *IS-14496-98- Guidelines for Land Slides-Hazard Zonation Mapping*
- *IS-14458-Retaining Walls for Hill Areas (parts 1,2 and 3)*
- *IS-14680-99-Guidelines for Landslide Control*
- *IS-14804-2000-Guidelines for Siting, Design, Selection of Materials for Residential Buildings in Hilly Areas*
- *All of them need speedy upgradation*

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Enforcement

- Therefore the National Building Code or National Standards or Codes for landslide protection should be made part or integrated with the city building regulatory documents like the city building bye-laws, city planning standards, city building code or city development control rules and also made part of the building regulatory practices at various stages.
- The Hill Municipalities/Panchayats/Development Authorities to take special care(J&K, HP, Uttaranchal, NE States, Maharashtra, MP, Kerala, Karnataka, Tamil Nadu Hill Areas to take special care

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Techno-financing regime

- Financial assistance is needed not only in terms of loans for capital works but also for technology promotion through encouragement of R&D efforts, Slope instrumentation, monitoring land slide prediction, early warning systems, preparing Comprehensive Disaster Mitigation Plans at all levels including village, district, state and national levels
- No Early warning systems for land slides in India so far
- Funds are also required for appropriate technology transfer and delivery mechanisms through Building Centres for dissemination of disaster reduction technologies and wide scale media campaigns for educating the public on how to face up to disasters and construction of disaster resistant shelters
- All funding from Government, Financial institutions, NGO's should be subject to compliance of disaster-resistant features through techno-financing regime. The recent orders of Reserve Bank of India is a positive step in this direction

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Way Forward

1. Creating awareness on vulnerability for landslide hazards

Does the state, city, town or village have appropriate awareness on the nature of vulnerability against landslides? If not, the action plan for creating such awareness has to be evolved.

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Way Forward

2. Creating awareness among general public for application

Creating awareness through all user friendly media among the general public and the community on the dangers of landslide, safe land development and safer building construction as a pre-requisite for ensuring larger public participation and application.

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Way Forward

3. Establishing Techno-Legal Regime

The methodology to be adopted for creating a techno-legal regime by evolving disaster resistant safe land development and building construction features in the building regulatory media is to be established, with effective enforcement mechanism

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Way Forward

4. Associating the right professionals

The compulsory association of the right level of professionals will help in fixing responsibility and accountability on the owners, builders, practicing professionals be it the geo-technical engineers, architect, engineer, structural engineer in the planning, design, construction and supervision stages.

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Way Forward

5. Evolving appropriate technology transfer system at the cutting edge level

Evolving methodologies for technology transfer at the grass root level for land protection and safer building construction systems for the construction work force should be given priority attention and action + Portable hand operated stitching machine + Non-engineered constructional systems

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Way Forward

6. Adopting the techno-financing Regime

The methodologies to be adopted for a techno-financing regime for prediction and warning, promoting safer land development and building construction systems in disaster prone areas by using financing / insurance mechanism as instruments for risk mitigation has to be clearly established.

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Way Forward

7. Mobilising participation of civil society

Mobilising people's participation including association of NGOs and CBOs converting the initiatives of safer land protection and environment protection and safer building construction for promoting safer human settlements

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**Let us
Work together
for
Safer, Durable and Sustainable
Human Settlements**

**Thank you for
your kind attention**

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